Letter to the New England Journal of Medicine
[September, 1990]

To the Editors: In their January 11 article Needleman et al. [1] report strikingly large effects of low lead levels on several late adolescence outcomes. For example, an estimated 7.4-fold increased odds of school failure was attributed to childhood lead dentin levels above 20 ppm. Such massive effects sizes contrast sharply with results of other studies relating low lead level to earlier developmental outcomes [2-4]. The authors argue that the estimated effects represent causal relationships because their analysis controlled for ten socio-demographic covariates. This conclusion of causality may be premature, however, because the covariate set did not include measures of the quality of child care (i.e., parental responsitivity, involvement with the child, provision of books, suitable playthings, etc.), a primary confounder in previous studies of developmental lead effects. Thus the reported lead effects may be partly due to spurious association induced by variations in the caretaking environment.

Indices of child care quality such as the HOME [5] and the CLL [6] have repeatedly been found to be strongly related to lead level in poor and working class children [2,4,7,8]. Quality of child care is also strongly associated with developmental outcome [9], including school performance through adolescence [10]. These confounding effects are conceptually distinct from and only partly accounted for empirically by socio-demographic variables such as maternal IQ and parental education [11], which were included as covariates by Needleman et al. The fact that none of the reported lead effects were attenuated by inclusion of their covariates, as is usually the case in observational studies of low lead levels, indicates that confounders such as child care may not have been fully controlled.

On another matter, the present report is a follow-up of a 1979 report [12] which troubled reviewers [13], in part, because many cases were excluded after testing. In a written response to the review [14], Needleman reported data indicating that a key IQ analysis was substantially affected by 16 of the

excluded children with excess lead, or plumbism: Prior to exclusion, with N = 187, the lead effect $\underline{t}$ = -1.51 ($\underline{p}$ = .133, 2 - sided); after exclusion, with N = 171, $\underline{t}$ = -2.56 ($\underline{p}$ = .011). This suggests the presence of high IQ's in the plumbism group. In the present follow-up report, the previously excluded cases who agreed to participate were incorporated in the analysis, including, in separate descriptive summaries, ten of the plumbism cases. Five of these plumbism cases had reading disabilities, and three out of seven failed to graduate high school. These high proportions of adverse outcomes seem to corroborate the hypothesized lead effect. However, in view of the apparently contradictory IQ data described above, a summary of the IQ scores of all 16 plumbism cases would be helpful in assessing the implications of the findings.

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